



Federal Aviation
Administration

HTAWS

Presented to: Heli-Expo 2006

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Date: February 28, 2006

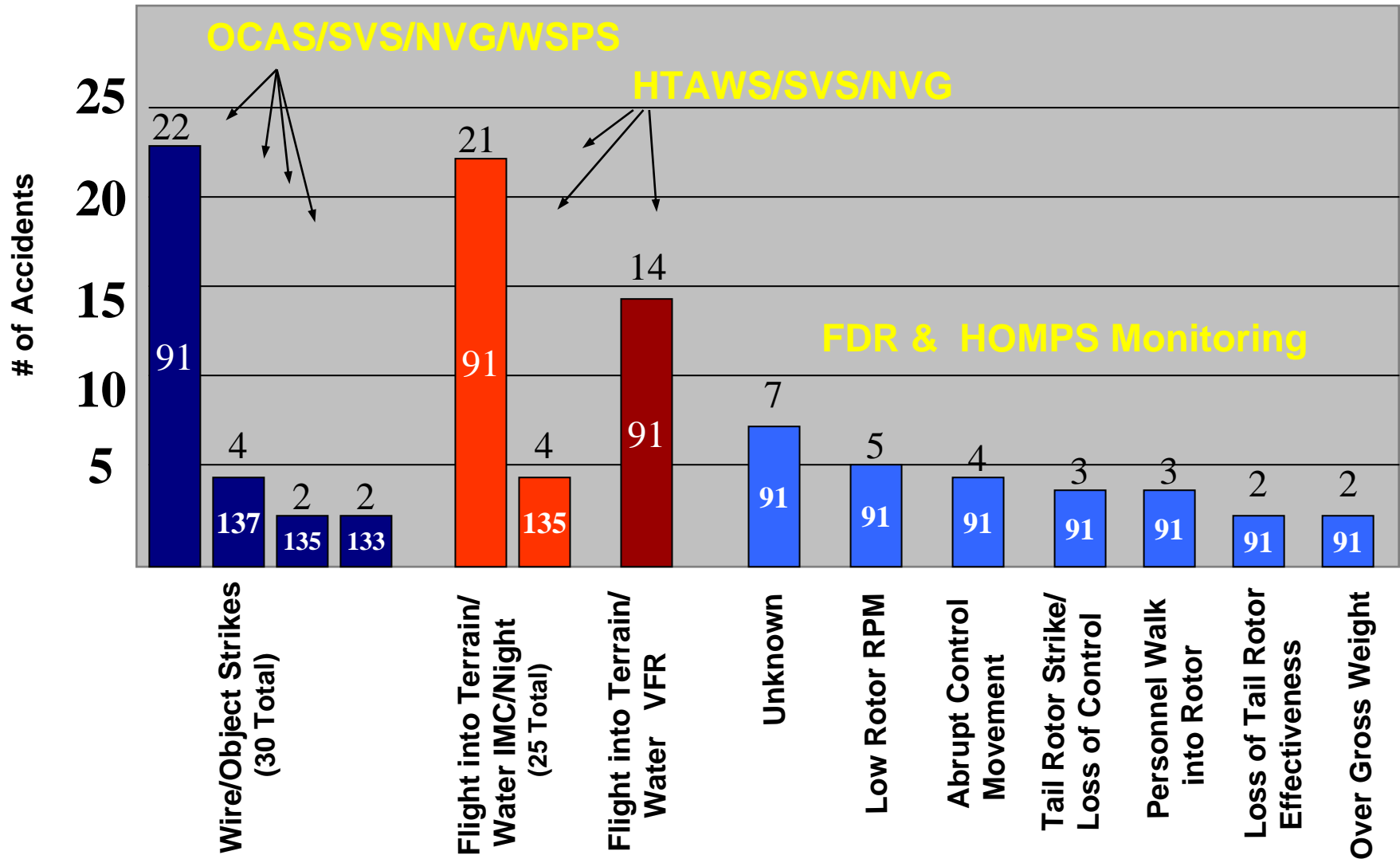


HELICOPTER TERRAIN AWARENESS AND WARNING SYSTEM (HTAWS)

- **WHY HTAWS**
- **DEVELOPMENT**
- **OPERATIONAL MODES**
- **TERRAIN DISPLAY COLOR PATTERNS**
- **CERTIFICATION GUIDANCE**
- **SYNTHETIC VISION SYSTEMS**



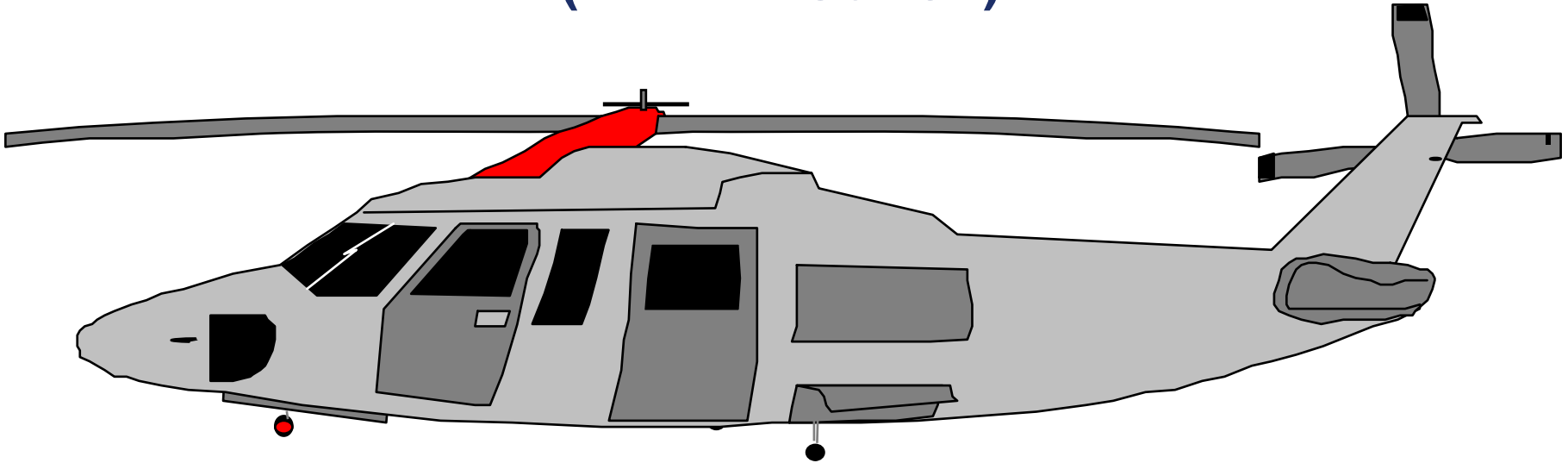
Top Operational Causes of Fatal Rotorcraft Accidents 1994 - 2004



Data Source: FAA ASAP



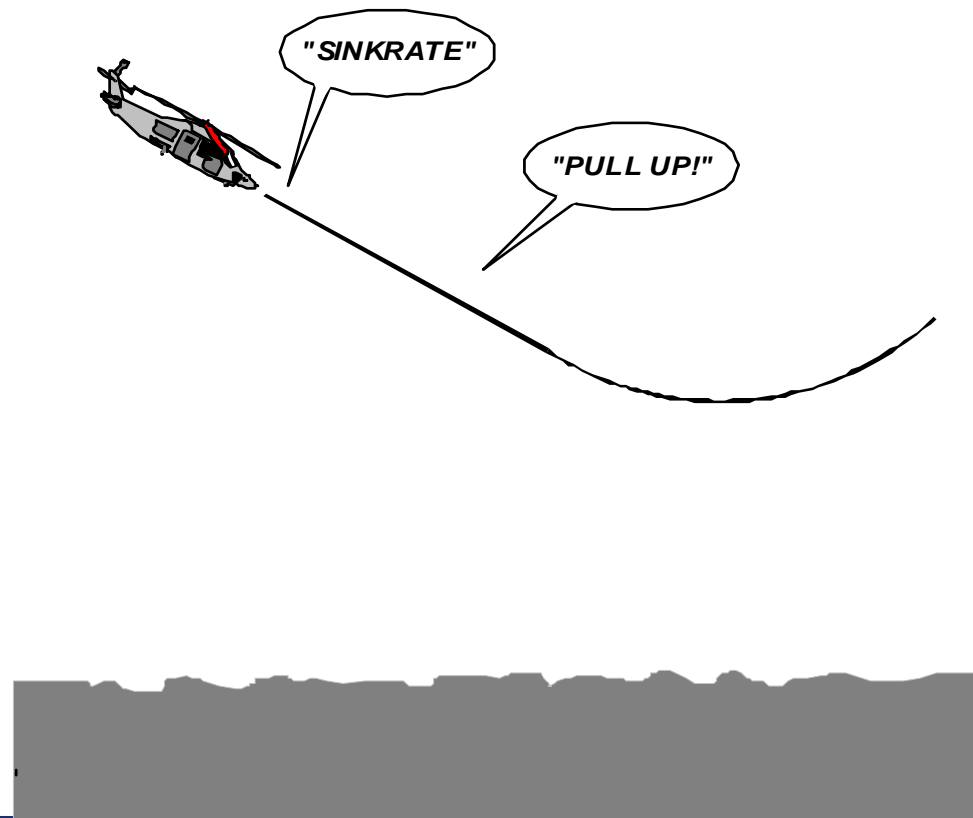
DEVELOPMENT (RITA PROJECT)



FAA Helicopter Terrain Awareness Warning System (HTAWS)

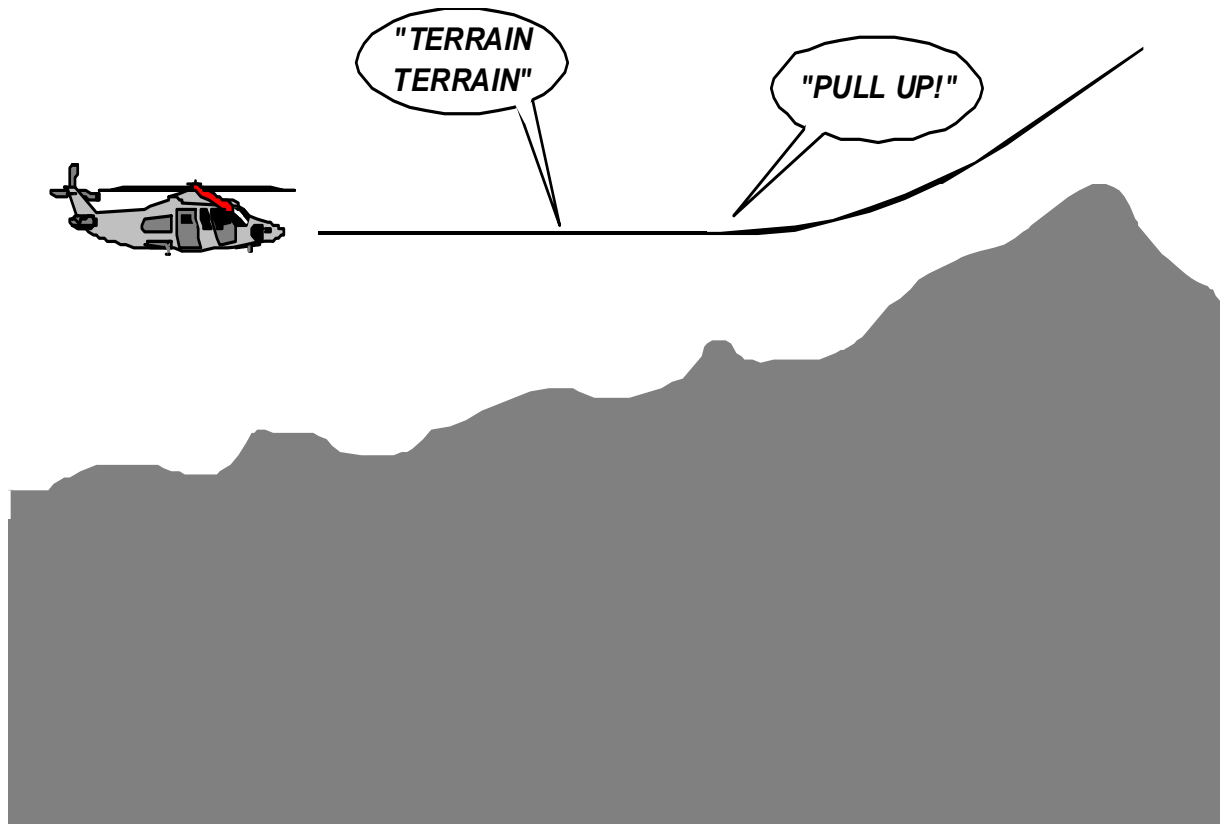
Mode 1 - Excessive Descent Rate

Descent Rate (Pressure Alt) Vs Clearance (Radio Alt)



Mode 2 - Excessive Terrain Closure

Closure Rate (Radio Alt) Vs Clearance (Radio Alt)



Mode 3 - Descent After Takeoff

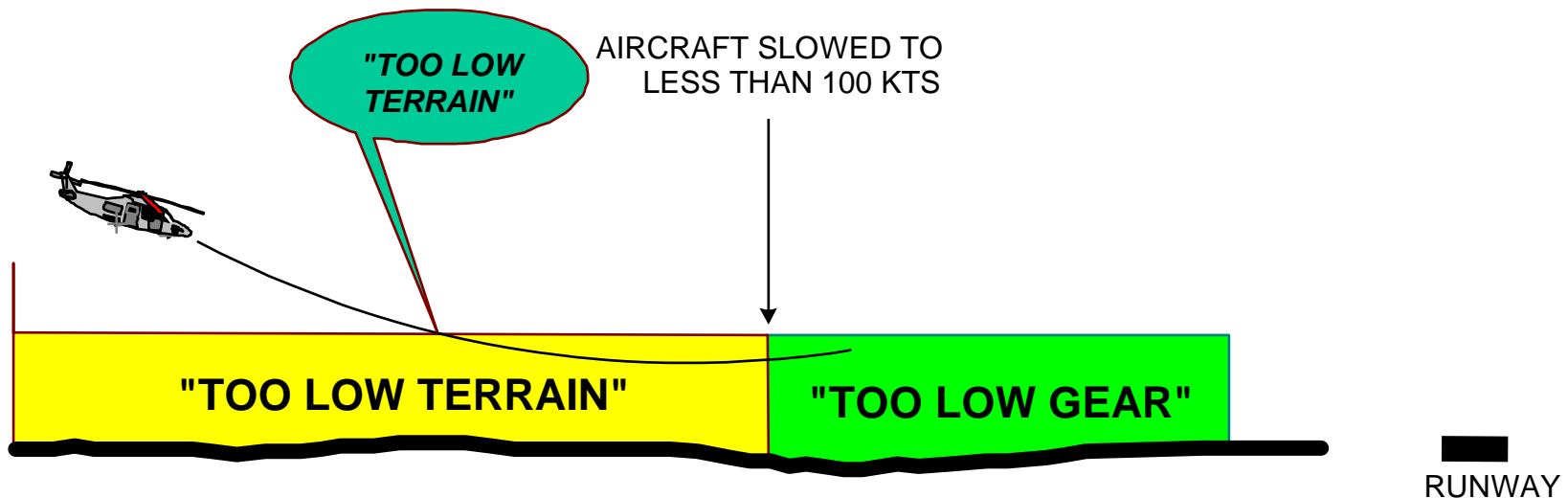
Altitude (Pressure Alt) Loss Vs Clearance (Radio Alt)



Mode 4A - Terrain Clearance - Gear Up

Clearance (Radio Alt) Vs Airspeed & Flight Phase

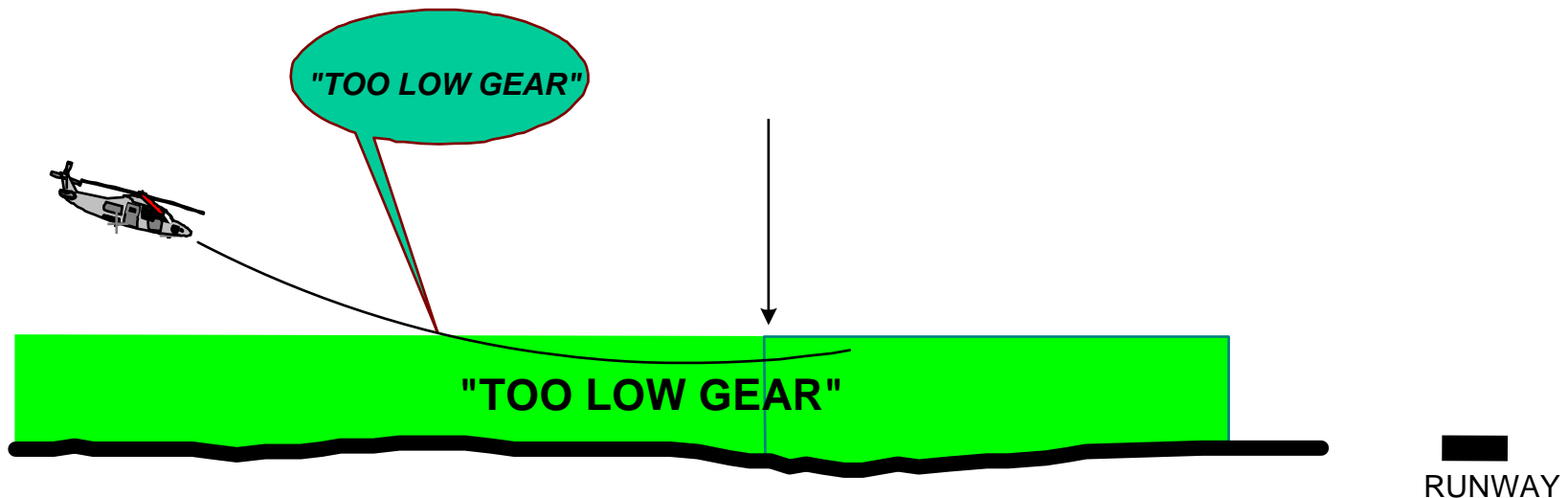
MODE 4A UNSAFE TERRAIN CLEARANCE



Mode 4A - Terrain Clearance - Gear Up Autorotation

Clearance (Radio Alt) Vs Airspeed & Flight Phase

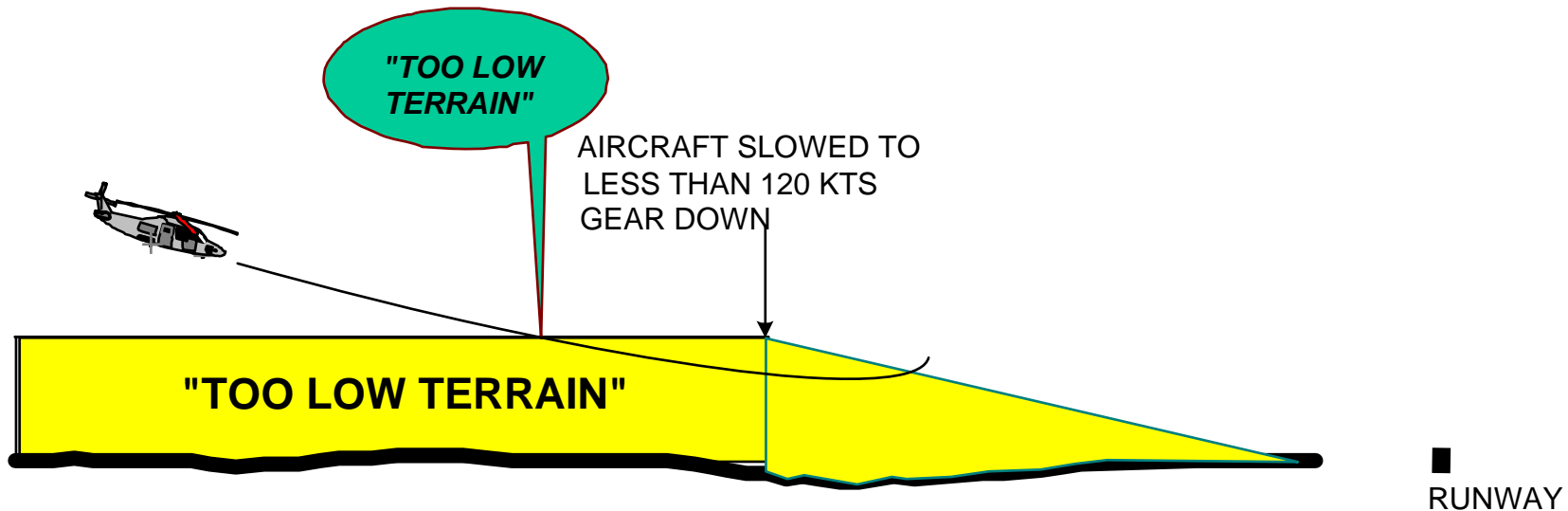
MODE 4A UNSAFE TERRAIN CLEARANCE AUTOROTATION



Mode 4B - Terrain Clearance - Gear Down

Clearance (Radio Alt) Vs Airspeed & Flight Phase

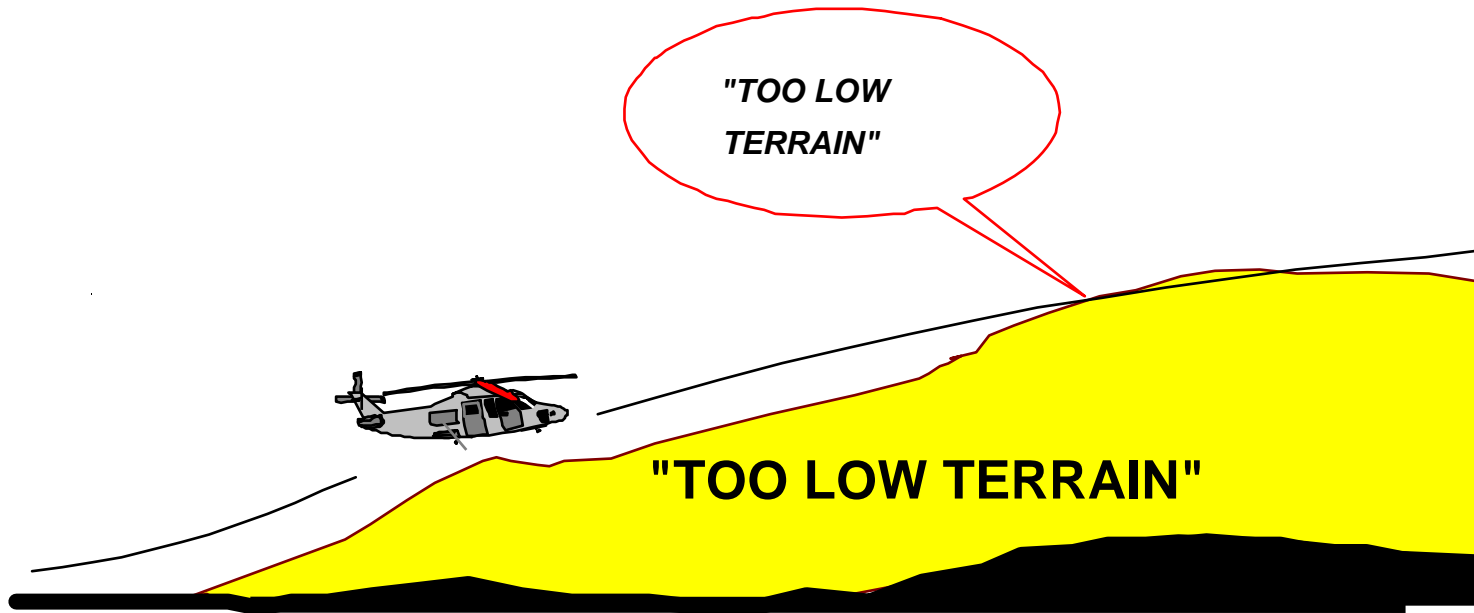
MODE 4B UNSAFE TERRAIN CLEARANCE



Mode 4C - Takeoff Into Raising Terrain

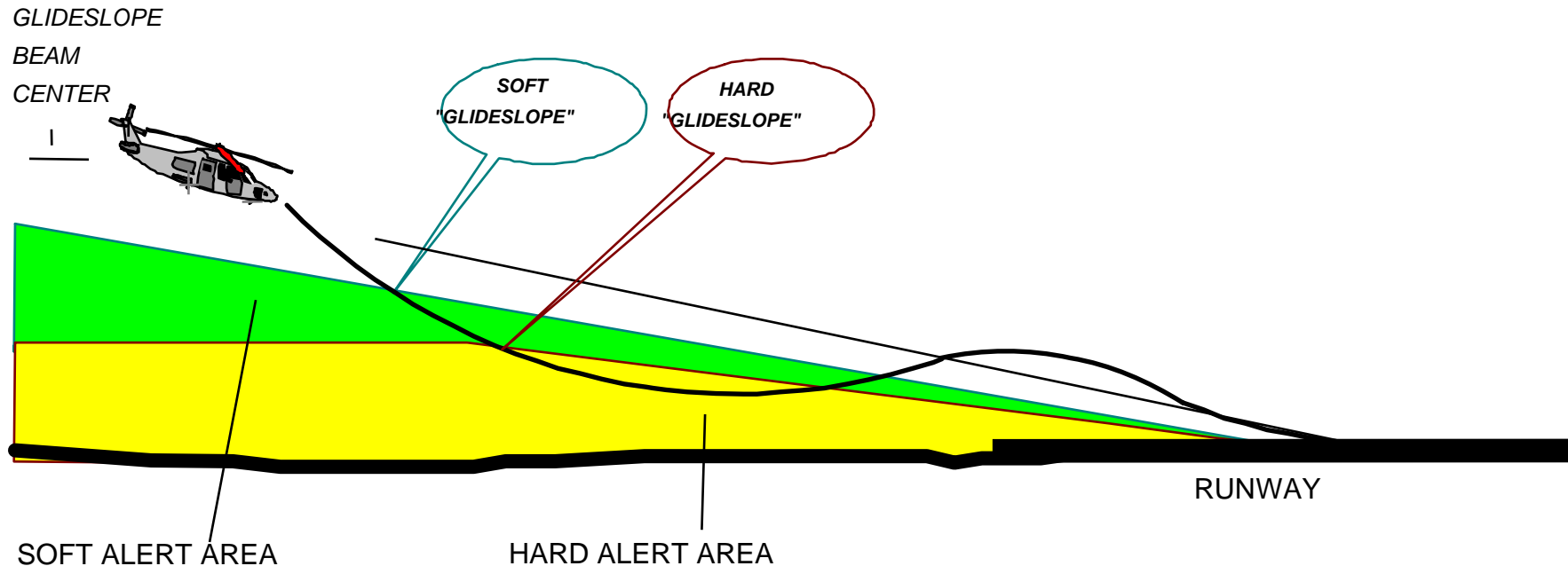
Clearance (Radio Alt) Vs Airspeed & Flight Phase

MODE 4C UNSAFE TERRAIN CLEARANCE



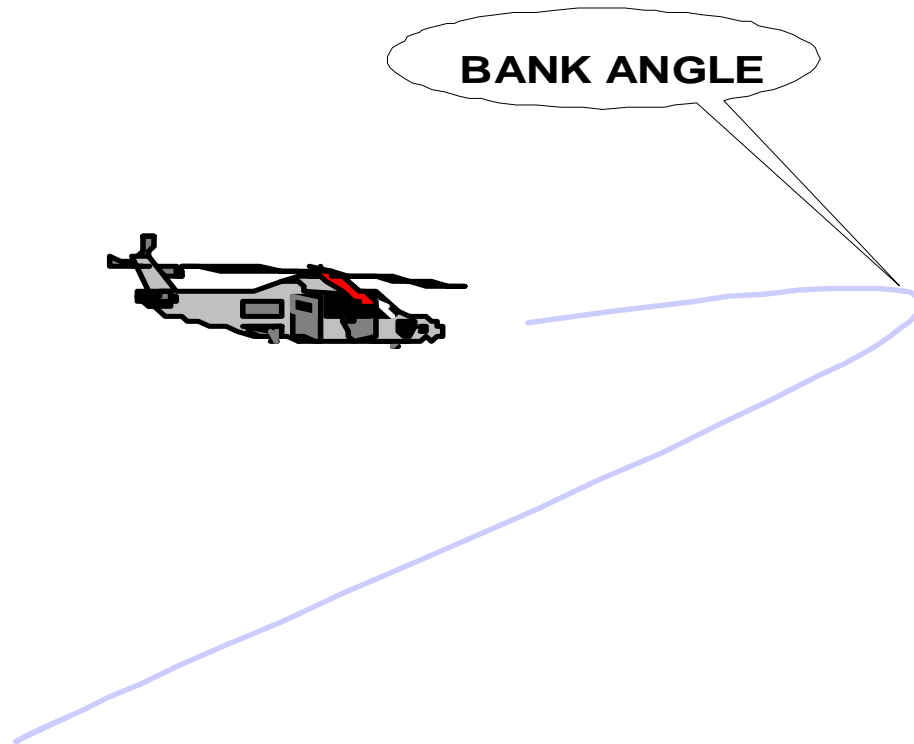
Mode 5 - Descent Below Glideslope

MODE 5 EXCESSIVE GLIDESLOPE DEVIATION

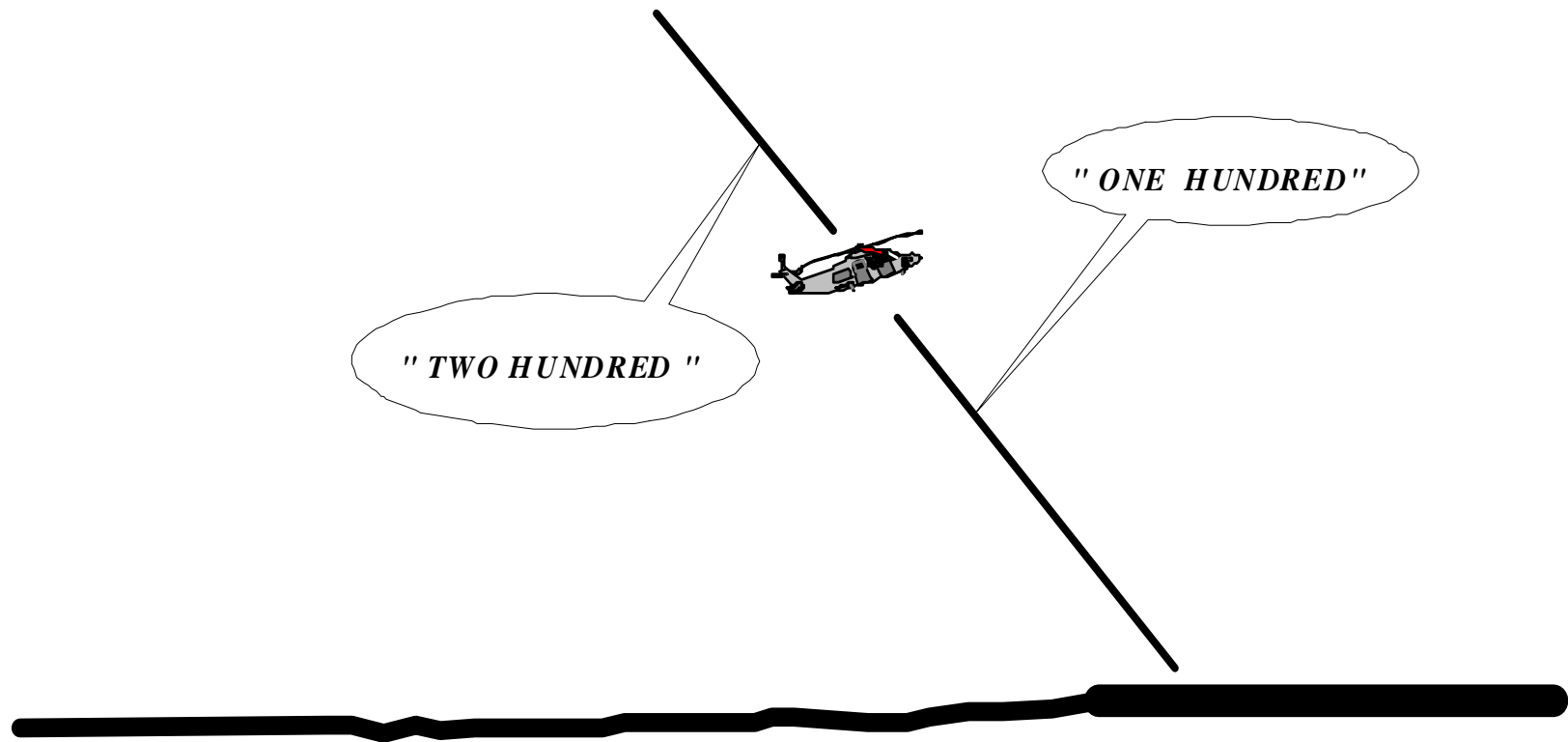


Mode 6 - Bank Angle

Aircraft Specific - S-76 is 30° to 55°



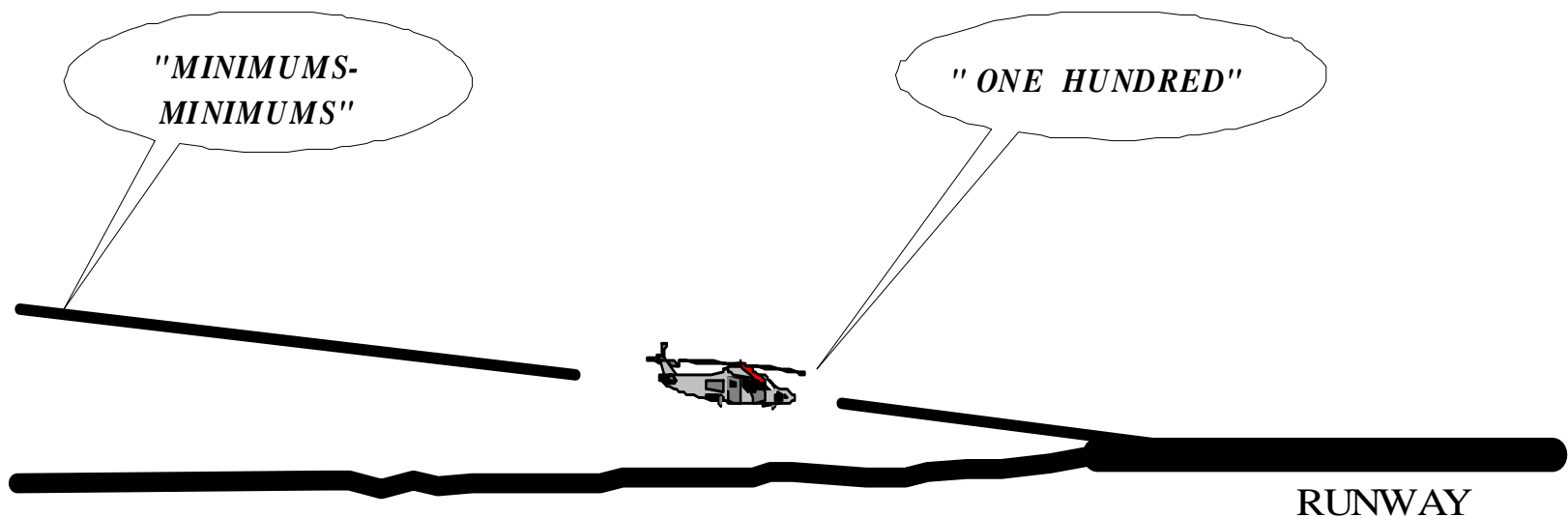
Mode 6 - Altitude Callouts Autorotation



Mode 6 - Altitude Callouts

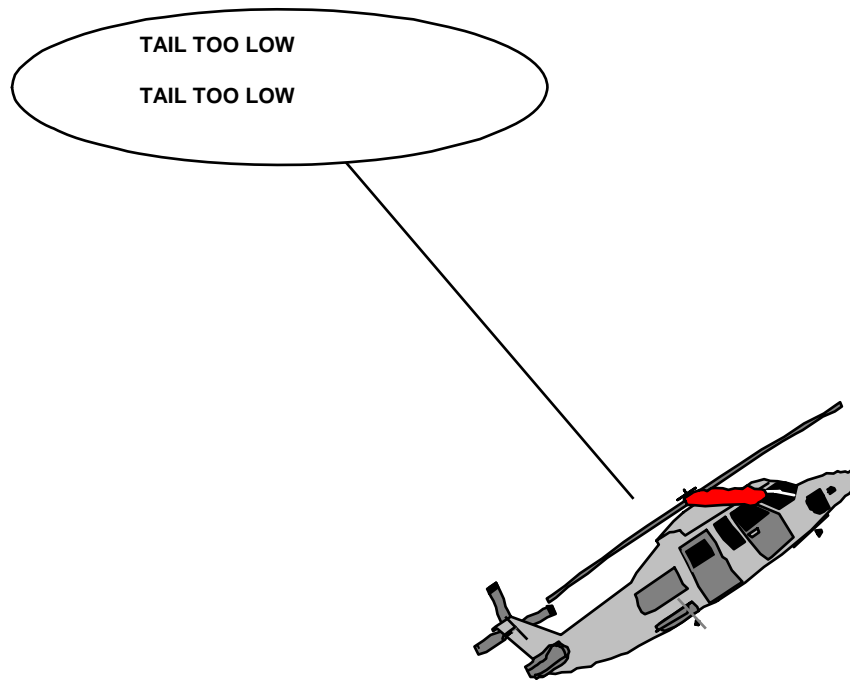
Normal Operation

Operator/Installer Selected



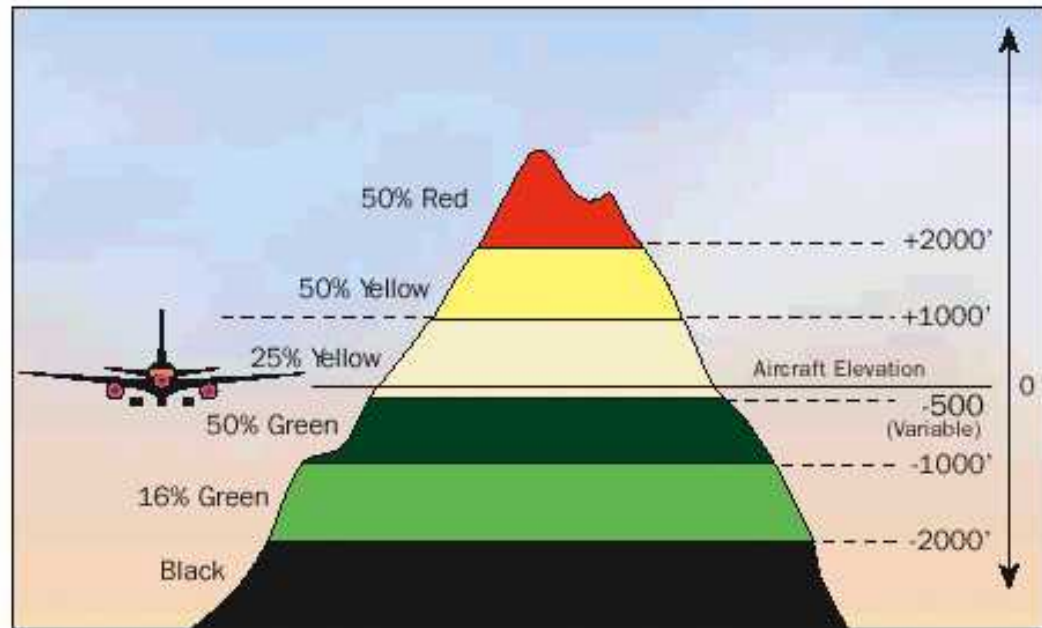
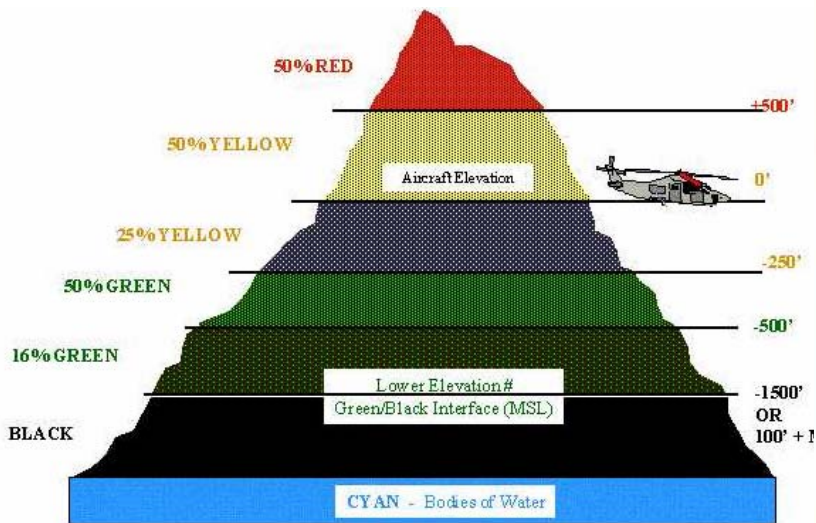
Mode 6 - Tail Strike

Aircraft Specific



TERRAIN DISPLAY COLORS

HELICOPTER vs AIRPLANE



CERTIFICATION GUIDANCE

- Advisory Circular AC 27-1B
 - AC 27 MG 18 Helicopter Terrain Awareness and Warning System (HTAWS) *Upcoming Change 2 update*
- Advisory Circular AC 29-2C
 - AC 29 MG 18 Helicopter Terrain Awareness and Warning System (HTAWS) *Upcoming Change 2 update*
- TSO – 151b Terrain Awareness and Warning System
 - *Considerations to TSO requirements for Helicopter Installations contained in AC 29 MG 18 guidance*

SYNTHETIC VISION SYSTEM



Questions?

